Name: _____   Date: _____
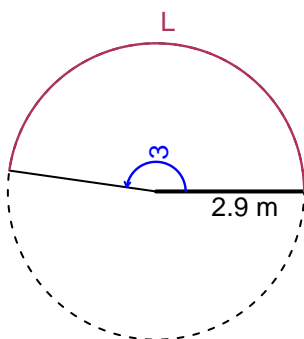
Trig Final (SLTN v608)

- You should have a calculator (like Desmos) and a unit-circle reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The angle measure is 3 radians. The radius is 2.9 meters. How long is the arc in meters?
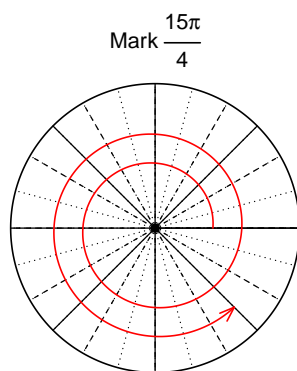

$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$
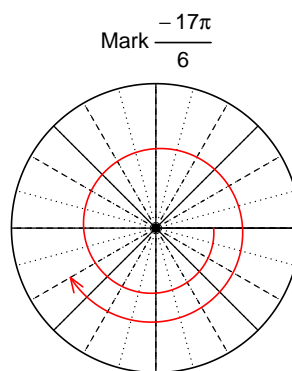
$L = 8.7$ meters.

Question 2

Consider angles $\frac{15\pi}{4}$ and $\frac{-17\pi}{6}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\sin\left(\frac{15\pi}{4}\right)$ and $\cos\left(\frac{-17\pi}{6}\right)$ by using a unit circle (provided separately).

Mark $\dfrac{15\pi}{4}$

Find $\sin(15\pi/4)$

Mark $\dfrac{-17\pi}{6}$
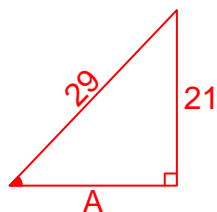
Find $\cos(-17\pi/6)$

$\sin(15\pi/4) = \frac{-\sqrt{2}}{2}$

$\cos(-17\pi/6) = \frac{-\sqrt{3}}{2}$

Question 3

If $\sin(\theta) = \frac{-21}{29}$, and θ is in quadrant III, determine an exact value for $\cos(\theta)$.
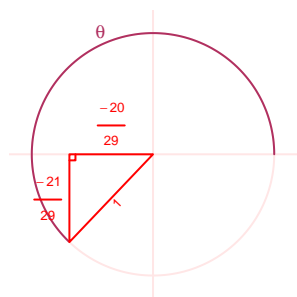
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.

Solve the Pythagorean Equation

$$A^2 + 21^2 = 29^2$$
$$A = \sqrt{29^2 - 21^2}$$
$$A = 20$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant III in a unit circle.

$$\cos(\theta) = \frac{-20}{29}$$

Question 4

A mass-spring system oscillates vertically with a frequency of 6.43 Hz, an amplitude of 7.55 meters, and a midline at $y = -4.43$ meters. At $t = 0$, the mass is at the midline and moving down. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = -7.55\sin(2\pi 6.43t) - 4.43$$

or

$$y = -7.55\sin(12.86\pi t) - 4.43$$

or

$$y = -7.55\sin(40.4t) - 4.43$$